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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/806,905	03/23/2004	David Scheinberg	D6499	2406

7590 12/23/2009

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EXAMINER	
FETTEROLF, BRANDON J	
ART UNIT	PAPER NUMBER
1642	

MAIL DATE	DELIVERY MODE
12/23/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

DETAILED ACTION

Response to the Amendment

The Response filed on 11/20/2009 in response to the previous Final Office Action (7/20/2009) is acknowledged and has been entered.

Claims 1-2, 4-5, 8-12, 49, 51-53 and 58-61 are currently pending and under consideration.

Rejections Withdrawn:

The rejection of Claims 1-2, 4-5, 8-12, 49, 51-53 and 58-61 under 35 U.S.C. 103(a) as being unpatentable over Scheinberg et al. (US 2002/0058007, 2002, *of record*) in view of Satoh et al. (Eur. J. Cancer Clin Oncol. 1989; 25: 1727-1731), Jones et al. (Nuclear Medicine & Biology 1996; 23: 105-113, *of record*), and Schilcher et al. (J. Can. Res. Clin. Oncol. 1984; 107: 57-60, *of record*) and in further view of Nair et al. (J. Radiat. Res. 2001; 42: 21-37) is withdrawn in view of Applicants arguments. Specifically, Applicants arguments pertaining to Schenberg et al. not teaching toxicity in the kidney.

Rejections Maintained:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-2, 4-5, 8, 10-11, 49, 51-53 and 59-60 remain rejected under 35 U.S.C. 103(a) as being unpatentable over Kennel et al. (Cancer Biotherapy & Radiopharmaceuticals 2000; 15: 235-244, *of record*) in view of Satoh et al. (Eur. J. Cancer Clin Oncol. 1989; 25: 1727-1731, of record), Jones et al. (Nuclear Medicine & Biology 1996; 23: 105-113, *of record*), and Schilcher et al. (J. Can.

Res. Clin. Oncol. 1984; 107: 57-60, *of record*) in further view of Nair et al. (J. Radiat. Res. 2001; 42: 21-37, of record).

Kennel et al. teach a method of treating lung cancer with alpha particles comprising administering a pharmacologically effective dose ^{225}Ac bound to a HEHA-MAb 210B conjugate (abstract). The reference further teaches that while the isotope coupled to the targeting monoclonal antibody delivers a tumorcidal dose to the lung, the radiotoxicity associated with decay daughter isotopes released from the target organ limit the effectiveness of the therapy (page 242, 2nd column, last paragraph). For example, Kennel et al. teach at necropsy, animals had total ablation of bone marrow cells, splenic atrophy, some damage to the lining of their stomachs and intestine and excess accumulation of undigested food in their stomachs (page 240, 1st column, paragraph bridging page 239).

Kennel et al. do not explicitly teach administering a competitive metal blocker such as bismuth subnitrate, a chelator such as DMPS or a diuretic such as furosemide in combination with the ^{225}Ac conjugate.

Satoh et al. teach the effects of preinduction of metallotheionein (MT) by bismuth subnitrate (BSN) on the adverse effects and antitumor activity of γ–ray irradiation in mice (abstract). In particular, the reference teaches that oral administration of BSN markedly reduced the lethal effects and bone marrow damage by γ–ray irradiation without compromising the tumor-reducing effect (page 1730, 1st column, last paragraph). As such, Satoh et al. teach that bismuth subnitrate pretreatment is an effective method for protection against side-effects in radiotherapy (abstract).

Jones et al. teach that a problem with the clinical use of ^{212}Bi or ^{212}Pb RICs (radioimmunoconjugates) is the potential for radiotoxicity as a consequence of either premature release of the metal by the chelate agent or metabolic catabolism of the RIT releasing from the radiometal (page 105, 2nd column 1st full paragraph). For example, the reference teaches that previous studies have identified the kidney as being potential targets for dose limitation toxicity from radio metal deposition of bismuth radioimmunoconjugates due to the presence of heavy metal biding proteins (page 109, 2nd column, 1st paragraph and page 112, 1st column, 1st full paragraph). As a way to circumvent this potential limitation, Jones et al. disclose the evaluation of the dithiol agents, 2,3-dimercapto-1-propanesulfonic acid (DMPS) and meso-2,3-dimercaptosuccinic acid (DMSA), for their use as adjuvants to reduce or prevent radiotoxicty of Lead-212 or Bismuth-212 alpha-

radioimmunotherapy. For example, the reference teaches the administration of DMPS or DMSA to mice 48 hours prior to receiving Bismuth acetate and maintaining the administration of the chelating agents for 72 hours post injection (page 109, 2nd column, 1st paragraph). Specifically, the reference teaches that administration of DMPS accelerated body clearance of bismuth and dramatically reduced early and late accumulation of bismuth in the kidney (page 112, 2nd column, *Conclusion*).

Schilcher et al. teach the use of furosemide, a diuretic, for the prevention of cumulative nephrotoxicity in a phase II evaluation of fractionated low and single high dose cisplatin in various tumors (abstract).

Nair et al. teach radioprotector in radiotherapy. In particular, the reference teaches that while acute toxicity has been a main reason for radioprotectors failure in clinical applications, the use of nontoxic amounts of several radioprotectors having a different mechanism of action can overcome the problems associated with their toxicity.

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention to combine the teachings of the references so as to modify the method taught by Kennel et al. to include administration of a metal blocker such as bismuth subnitrate, a chelator such as 2,3-dimercapto-1-propanesulfonic acid (DMPS) and a diuretic such as furosemide in view of the teachings of Satoh et al., Jones et al. and Schilcher et al.. One would have been motivated to do so because each of the references teach that the agents are effective at reducing toxicities associated with radiotherapies. Moreover, as taught by Nair et al., combining several radioprotectors having a different mechanism of action can overcome problems associated with radioprotector toxicity. Thus, one of ordinary skill in the art would have a reasonable expectation of success that by modifying the method taught by Kennel et al. to include administration of a metal blocker such as bismuth subnitrate, a chelator such as 2,3-dimercapto-1-propanesulfonic acid (DMPS) and a diuretic such as furosemide in view of the teachings of Satoh et al., Jones et al. and Schilcher et al., one would achieve a method for reducing the accumulation of ^{213}Bi in the kidney, as well as bone marrow damage.

Thus, while the combination does not explicitly teach that the diuretic inhibits reabsorption of Actinium-225 daughters and prevents accumulation of francium-221 and bismuth-213 daughters in the kidney, the claimed "wherein" limitation has not been given any patentable weight since it simply expresses the intended result of the process step, e.g., administration of the diuretic in

combination a chelated actinium-225 radioimmunoconjugate, postively recited. See In Hoffer v. Microsoft Corp., 405 F.3d 1326, 1329, 74 USPQ2d 1481, 1483 (Fed. Cir. 2005), (quoting Minton v. Nat 'l Ass 'n of Securities Dealers, Inc., 336 F.3d 1373, 1381, 67 USPQ2d 1614, 1620 (Fed. Cir. 2003))

In response to this rejection, Applicants contend that Kennel et al., as a primary reference, specifically state that although HEHA-chelated actinium 225 coupled to a targeting antibody may deliver a tumorical dose to the lung, the radiologic side effects due to release of daughter alpha's limits the effectiveness of therapy. Kennel also state that they know of no conventional chelate that would withstand the energy release. Thus, Applicants contend that it is clear that Kennel et al. view the radiotoxicity caused by 225Ac to be a significant problem for which there is no obvouis solution. Moreover, Applicants contend that, while some of the references cited by the Examiner address ways to deal with radiotoxicity, the standard for prima facie obviousness has not been met. In particular, Applicants contend that none of the references cited deal with reducing radiotoxicity of 225Ac. For example, Applicants assert that Schilcher et al. only mentions furosemide in a single sentence in the abstract, but fails to mention the effectiveness of furosemide in preventing radiotoxicity of 225Ac administration. In addition, Applicants contend that there is no teaching in Schilcher et al .regarding the dosage of furosemide to be administered nor any discussion on how effective the diuretic is in preventing nephrotoxicity. Lastly, Applicants remind the Examiner that motivation to combine prior art teachings must be found in the references themselves and cannot be constructed using improper hindsight reasoning. In view of this, Applicants submit that there is no rationale in Jones et al. nor Schilcher et al. which would motivate a person of ordinary skill in the art to combine methods of reducing radiotoxicity of 212Bi/212Pb and cisplatin with Kennel et al. which teach 225Ac radiotherapy.

These arguments have been carefully considered, but are not found persuasive.

First, it appears that Applicants are arguing the references individually, but does not account for the cited references used in combination. It must be remembered that the references are relied upon in combination and are not meant to be considered separately as in a vacuum. It is the combination of all of the cited and relied upon references, which make up the state of the art with regard to the claimed invention. Moreover, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference and it is

not that the claimed invention must be expressly suggested in any one or all of the references; but rather the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. In re Keller, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). Secondly, the Examiner recognizes that references cannot be arbitrarily combined and that there must be some reason why one skilled in the art would be motivated to make the proposed combination of primary and secondary references In re Nomiya, 184 USPQ 607 (CPA 1975). However, there is no requirement that an "express, written motivation to combine must appear in prior art references before a finding of obviousness." See Ruiz v. A.B. Chance Co., 357 F.3d 1270, 1276, 69 USPQ2d 1686, 1690 (Fed. Cir. 2004). For example, motivation to combine prior art references may exist in the nature of the problem to be solved (Ruiz at 1276, 69 USPQ2d at 1690) or the knowledge of one of ordinary skill in the art (National Steel Car v. Canadian Pacific Railway Ltd., 357 F.3d 1319, 1338, 69 USPQ2d 1641, 1656 (Fed. Cir. 2004)). References are evaluated by what they suggest to one versed in the art, rather than by their specific disclosures. In re Bozek, 163 USPQ 545 (CCPA 1969). In the instant case, the Examiner recognizes that Kennel et al. teach a method of treating lung cancer with alpha particles comprising administering a pharmacologically effective dose ^{225}Ac bound to a HEHA-MAb 210B conjugate, wherein the radiotoxicity associated with 213Bi accumulation in the kidneys limits the effectiveness of the therapy, while Satoh et al., Jones et al. and Schilcher et al. each teach agents which are effective at reducing toxicities associated with radiotherapies . As such, one of ordinary skill in the art would have a reasonable expectation of success that by modifying the method taught by Kennel et al. to include administration of a metal blocker such as bismuth subnitrate, a chelator such as 2,3-dimercapto-1-propanesulfonic acid (DMPS) and a diuretic such as furosemide in view of the teachings of Satoh et al., Jones et al. and Schilcher et al., one would achieve a method for reducing the accumulation of ^{213}Bi in the kidney, as well as bone marrow damage. Thirdly, regarding Applicants specific assertion to Schilcher et al., the Examiner acknowledges and does not dispute Applicants arguments that the reference is silent on administering furosemide for Ac225 radiotoxicity. However, the Examiner recognizes, in contrast to Applicants arguments, that Schilcher clearly suggest that furosemide is effective at preventing cumulative nephrotoxicity (see Title). Accordingly, Applicants arguments with regards to this are rendered moot. Lastly, regarding Applicants arguments pertaining to hindsight, the Examiner recognizes that any judgment on obviousness is in a sense necessarily a reconstruction based upon

hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). As set forth above, the Examiner recognizes that Kennel et al. teach a method of treating lung cancer with alpha particles comprising administering a pharmacologically effective dose ^{225}Ac bound to a HEHA-MAb 210B conjugate, wherein the radiotoxicity associated with 213Bi accumulation in the kidneys limits the effectiveness of the therapy, while Satoh et al., Jones et al. and Schilcher et al. each teach agents which are effective at reducing toxicities associated with radiotherapies. As such, one of ordinary skill in the art would have a reasonable expectation of success that by modifying the method taught by Kennel et al. to include administration of a metal blocker such as bismuth subnitrate, a chelator such as 2,3-dimercapto-1-propanesulfonic acid (DMPS) and a diuretic such as furosemide in view of the teachings of Satoh et al., Jones et al. and Schilcher et al., one would achieve a method for reducing the accumulation of ^{213}Bi in the kidney, as well as bone marrow damage.

Claims 1-2, 4-5, 8-12, 49, 51-53 and 58-61 remain rejected under 35 U.S.C. 103(a) as being unpatentable over McDevitt et al. (Science 2001; 294: 1537-1540*, of record*) in view of Satoh et al. (Eur. J. Cancer Clin Oncol. 1989; 25: 1727-1731), Jones et al. (Nuclear Medicine & Biology 1996; 23: 105-113*, of record*), and Schilcher et al. (J. Can. Res. Clin. Oncol. 1984; 107: 57-60*, of record*) and in further view of Nair et al. (J. Radiat. Res. 2001; 42: 21-37).

McDevitt et al. teach a method of treating cancerous cells with alpha particles comprising administering a pharmacologically effective dose of an ^{225}Ac conjugate comprising a functionalized chelate (page 1537, Abstract). With regards to the cancer, the reference teaches (page 1537, Abstract) that cancers include, but are not limited to, prostate cancer, lymphoma, leukemia, neuroblastoma, breast and ovarian cancer. With regards to the ^{225}Ac conjugate, the reference teaches (page 1538, 1st column, 2nd full paragraph) that the conjugate consists of a monoclonal antibody covalently attached to a metal chelate that complexes with ^{225}Ac, wherein internalization of ^{225}Ac into the cells permits the emission of alpha particles or its daughters such as ^{221}Fr and ^{213}Bi. For example, Scheinberg et al. provides (page 1538, 1st column, 2nd full paragraph) an ^{225}Ac conjugate consisting of ^{225}Ac, HuM195 antibody and DOTA as the chelating agent. Moreover, the publication discloses the biodistribution

of ^{225}Ac conjugates in tumor bearing mice, wherein the results demonstrated specific tumor uptake of ^{225}Ac, but ^{213}Bi, e.g. *daughter of ^{225}Ac*, accumulation in the kidney as a result of decay of the daughters from nontargeted constructs (page 1538, Figure 1B).

McDevitt et al. does not explicitly teach administering a diuretic such as furosemide, a dithiol chelate and a metal blocker such as bismuth subnitrate in combination with the ^{225}Ac conjugate.

Satoh et al. teach the effects of preinduction of metallotheionein (MT) by bismuth subnitrate (BSN) on the adverse effects and antitumor activity of γ–ray irradiation in mice (abstract). In particular, the reference teaches that oral administration of BSN markedly reduced the lethal effects and bone marrow damage by γ-ray irradiation without compromising the tumor-reducing effect (page 1730, 1st column, last paragraph). As such, Satoh et al. teach that bismuth subnitrate pretreatment is an effective method for protection against side-effects in radiotherapy (abstract).

Jones et al. teach that a problem with the clinical use of ^{212}Bi or ^{212}Pb RICs (radioimmunoconjugates) is the potential for radiotoxicity as a consequence of either premature release of the metal by the chelate agent or metabolic catabolism of the RIT releasing from the radiometal (page 105, 2nd column 1st full paragraph). For example, the reference teaches that previous studies have identified the kidney as being potential targets for dose limitation toxicity from radio metal deposition of bismuth radioimmunoconjugates due to the presence of heavy metal biding proteins (page 109, 2nd column, 1st paragraph and page 112, 1st column, 1st full paragraph). As a way to circumvent this potential limitation, Jones et al. disclose the evaluation of the dithiol agents, 2,3-dimercapto-1-propanesulfonic acid (DMPS) and meso-2,3-dimercaptosuccinic acid (DMSA), for their use as adjuvants to reduce or prevent radiotoxicty of Lead-212 or Bismuth-212 alpha-radioimmunotherapy. For example, the reference teaches the administration of DMPS or DMSA to mice 48 hours prior to receiving Bismuth acetate and maintaining the administration of the chelating agents for 72 hours post injection (page 109, 2nd column, 1st paragraph). Specifically, the reference teaches that administration of DMPS accelerated body clearance of bismuth and dramatically reduced early and late accumulation of bismuth in the kidney (page 112, 2nd column, *Conclusion*).

Schilcher et al. teach the use of furosemide, a diuretic, for the prevention of cumulative nephrotoxicity in a phase II evaluation of fractionated low and single high dose cisplatin in various tumors (abstract).

Nair et al. teach radioprotector in radiotherapy. In particular, the reference teaches that

while acute toxicity has been a main reason for radioprotectors failure in clinical applications, the use of nontoxic amounts of several radioprotectors having a different mechanism of action can overcome the problems associated with their toxicity.

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention to combine the teachings of the references so as to modify the method taught by McDevitt to include administration of a metal blocker such as bismuth subnitrate, a chelator such as 2,3-dimercapto-1-propanesulfonic acid (DMPS) and a diuretic such as furosemide in view of the teachings of Satoh et al., Jones et al. and Schilcher et al.. One would have been motivated to do so because each of the references teach that the agents are effective at reducing toxicities associated with radiotherapies. Moreover, as taught by Nair et al., combining several radioprotectors having a different mechanism of action can overcome problems associated with radioprotector toxicity. Thus, one of ordinary skill in the art would have a reasonable expectation of success that by modifying the method taught by McDevitt to include administration of a metal blocker such as bismuth subnitrate, a chelator such as 2,3-dimercapto-1-propanesulfonic acid (DMPS) and a diuretic such as furosemide in view of the teachings of Satoh et al., Jones et al. and Schilcher et al., one would achieve a method for reducing the accumulation of ^{213}Bi in the kidney, as well as bone marrow damage.

Thus, while the combination does not explicitly teach that the diuretic inhibits reabsorption of Actinium-225 daughters and prevents accumulation of francium-221 and bismuth-213 daughters in the kidney, the claimed "wherein" limitation has not been given any patentable weight since it simply expresses the intended result of the process step, e.g., administration of the diuretic in combination a chelated actinium-225 radioimmunoconjugate, positively recited. See In Hoffer v. Microsoft Corp., 405 F.3d 1326, 1329, 74 USPQ2d 1481, 1483 (Fed. Cir. 2005), (quoting Minton v. Nat 'l Ass 'n of Securities Dealers, Inc., 336 F.3d 1373, 1381, 67 USPQ2d 1614, 1620 (Fed. Cir. 2003))

In response this rejection, Applicants contend that the combined references do not render the claimed invention obvious. First, Applicants contend that McDevitt et al. disclose that their method of administering a single dose of alpha particles can induce tumor regression without toxicity. Thus, Applicants contend that one of ordinary skill in the art would have no reason to combine McDevitt et al .with methods which reduce radiotoxicity levels in kidneys. Secondly,

Applicants assert that while McDevitt et al. do show a biodistribution plot which show levels of 225Ac daughters localized in the kidney, the data is from a single mouse model. Furthermore, Applicants assert that there is no mention of whether the dosage found in the kidney is toxic. Thus, once again, a person of common sense would have no motivation to search for a method of reducing toxicity in kidneys resulting in the administration of 225Ac. Lastly, as discussed above, Applicants contend that the other references fail to discuss the radiotoxicity resulting from 225Ac administration. Therefore, Applicants contend that the standard of prima facie obviousness has not been met.

These arguments have been carefully considered, but are not found persuasive.
In response to Applicants arguments pertaining to McDevitt et al., the Examiner acknowledges and does not dispute Applicants contention that McDevitt et al. discloses methods of administering a single dose of alpha particle can induce tumor regression without toxicity. However, the Examiner recognizes that McDevitt discloses the biodistribution of ^{225}Ac conjugates in tumor bearing mice, wherein the results demonstrated specific tumor uptake of ^{225}Ac, but ^{213}Bi, e.g. *daughter of* ^{225}*Ac*, accumulation in the kidney as a result of decay of the daughters from nontargeted constructs (page 1538, Figure 1B). Thus, one of ordinary skill in the art would have a reasonable expectation of success that by modifying the method taught by McDevitt to include administration of a metal blocker such as bismuth subnitrate, a chelator such as 2,3-dimercapto-1-propanesulfonic acid (DMPS) and a diuretic such as furosemide in view of the teachings of Satoh et al., Jones et al. and Schilcher et al., one would achieve a method for reducing the accumulation of ^{213}Bi in the kidney, as well as bone marrow damage. Applicants are reminded that the references are relied upon in combination and are not meant to be considered separately as in a vacuum. It is the combination of all of the cited and relied upon references, which make up the state of the art with regard to the claimed invention. The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference and it is not that the claimed invention must be expressly suggested in any one or all of the references; but rather the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. In re Keller, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). Lastly, Applicants arguments pertaining to the other references have been addressed supra.

Therefore, No Claim is allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRANDON J. FETTEROLF whose telephone number is (571)272-2919. The examiner can normally be reached on Monday through Friday from 7:30 to 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Larry Helms can be reached on 571-272-0832. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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